

# ATL CDA Phase 1.5

CDA Task Force Briefing



# Objectives

---

Review where we have been and where we are going next...

- ATL CDA Phase 1.0 - Summary

- Design
- Implementation
- Results
- Summary

- ATL CDA Phase 1.5

- Philosophy behind 1.5
- Partnerships
- Design
- Implementation

# ATL CDA Phase 1.0 – Design

---

## Three goals:

### Short Term:

Demonstrate predicted lateral and vertical paths, as well as spacing and merging tools

### Mid Term:

Utilize lessons learned to develop more efficient STARS with increased emphasis on CDA efficiencies

### Long Term:

Develop RNAV STARS with optimized lateral and vertical paths (CDA) flown using Descend Via protocol

# ATL CDA Phase 1.0 – Design

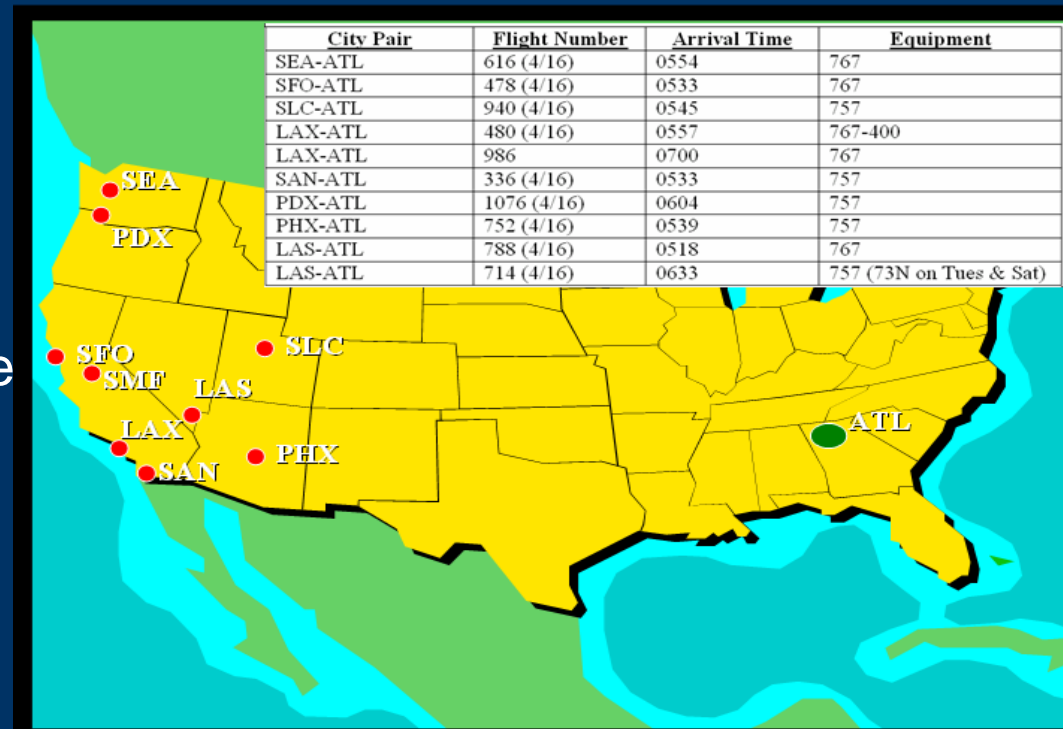
---

- TASAT simulations (Georgia Tech) were used to:
  - Explore different speed and altitude constraints
  - Determine optimum set of constraints
- Design group for KIRMT (ERLIN): GaTech, FAA and Delta
- Full-motion simulator tests used to demonstrate that:
  - Aircraft (757, 767, 73NG) consistently hit altitudes predicted by Georgia Tech models -- within less than 100' in varying tailwind conditions (140kts-80kts) at 30,000ft
  - Little or no use of drag devices to meet profile
  - Stabilized approach criteria was met in all cases
  - Other factors were also examined such as usage of Engine Anti-ice
- Success of simulations led to decision to proceed with the ATL CDA Test Program

# ATL CDA Phase 1.0 – Implementation

## Flight Test Overview

- April 16, 2007 – May 30, 2007
  - Single Stream ERLIN/KIRMT arrivals only
- Identified 8 city pairs to participate on a daily basis
- Criteria for selection...
  - Early morning arrivals before significant traffic flow increase (0645 local)
- Due to marketing fluctuations not all flights operated on a daily basis



# ATL CDA Phase 1.0 – Implementation

---

## Pilot Information Package

- Designed as a “One Stop Shopping” tool:
  - Background on CDA
  - Pilot Procedures & ATC Communication
  - Contingencies
  - Concise Checklist
  - Pilot Feedback Form
  - Appropriate STAR
  - Contact Resources (FYI: Calls were received 24 hours a day)
- Developed and vetted by DAL Flight Ops & Fleets, ALPA, ATC, Georgia Tech; distributed via email and mailboxes

# KIRMT CDA STAR

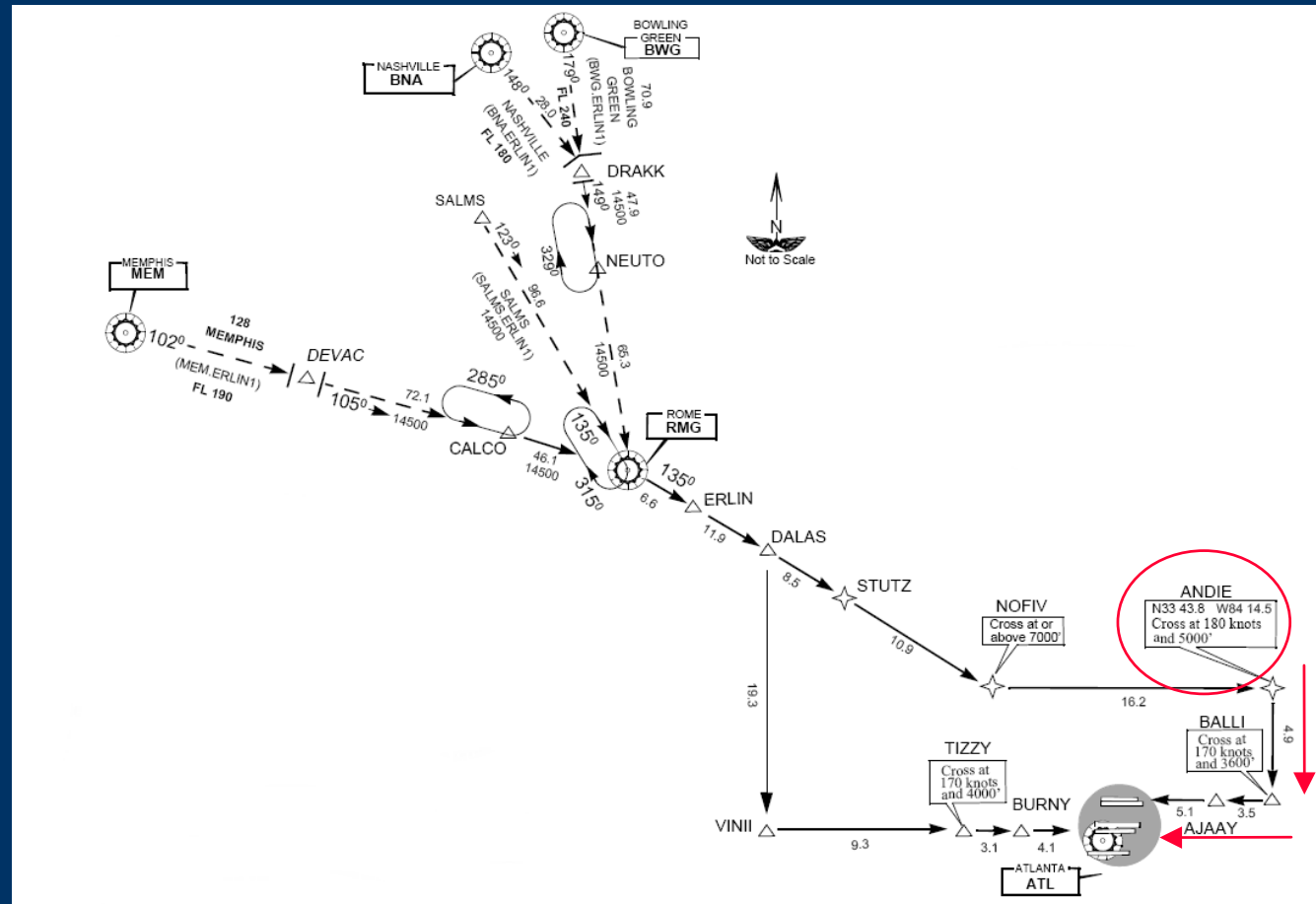


# ATL CDA Phase 1.0 – Implementation

## FMC Programming

Select KIR26R  
Select ILS 26R

Remove Route  
Discontinuity  
between ANDIE  
and BALLI

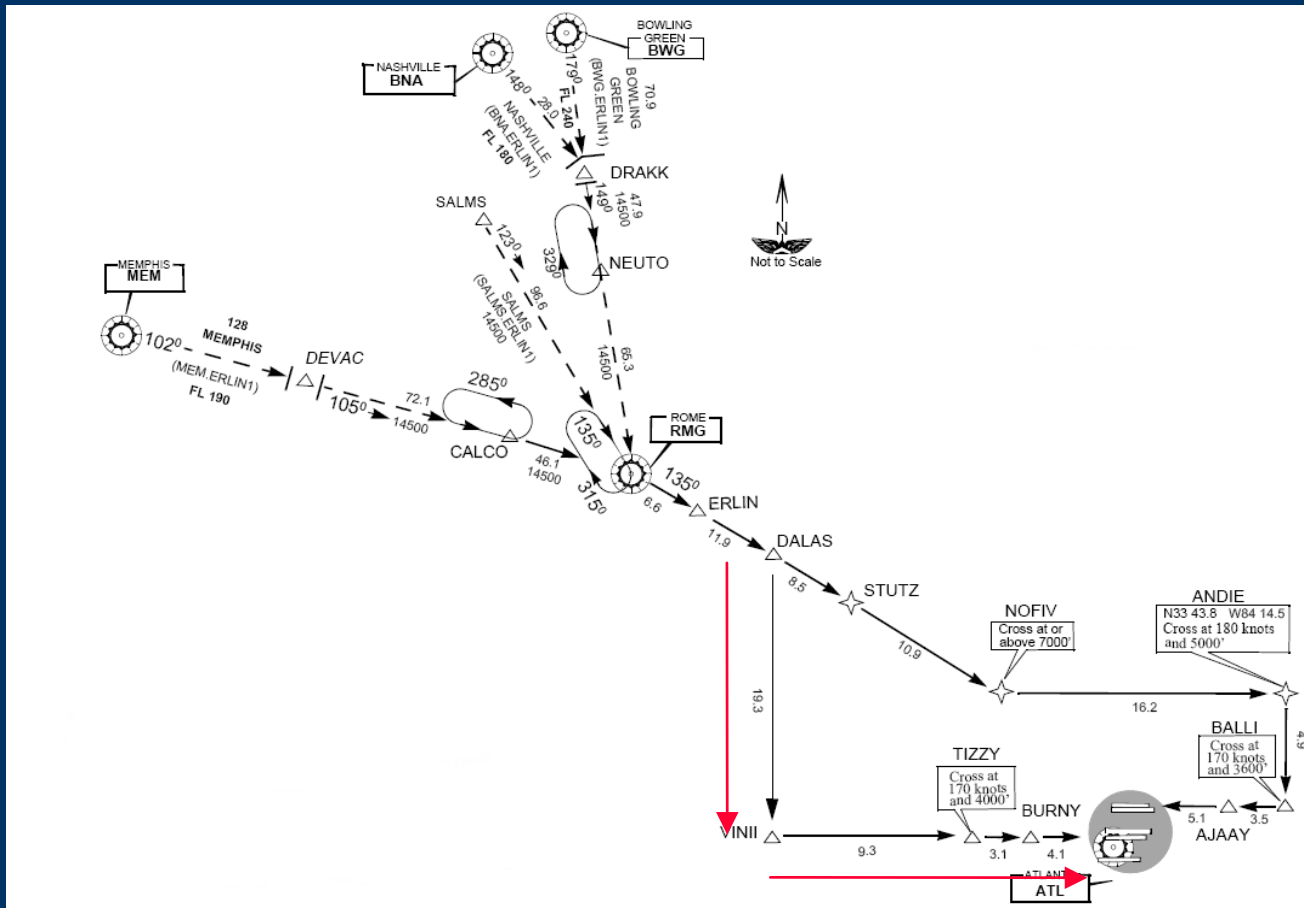




# ATL CDA Phase 1.0 – Implementation

## FMC Programming

Select KIR09R  
Select ILS 09R  
Connect DALAS to  
VINII



# ATL CDA Phase 1.0 – Implementation

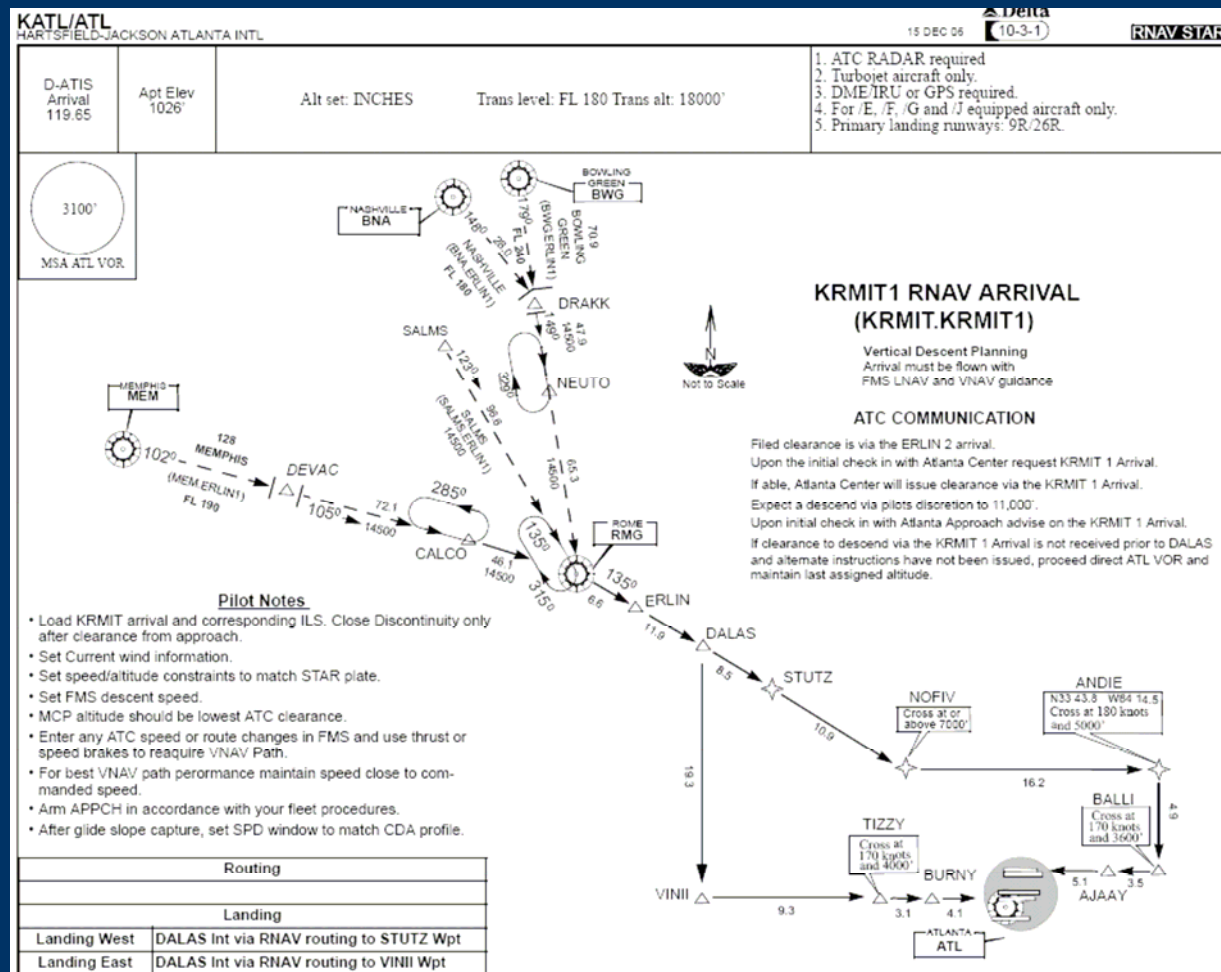
100nm from RMG:

Check in with ATL Ctr  
“Requesting KIRMT CDA”

This was the indication crew  
was participating

Clearance for KIRMT was  
ATC’s concurrence with the  
test flight

Crew received PD to  
11,000’



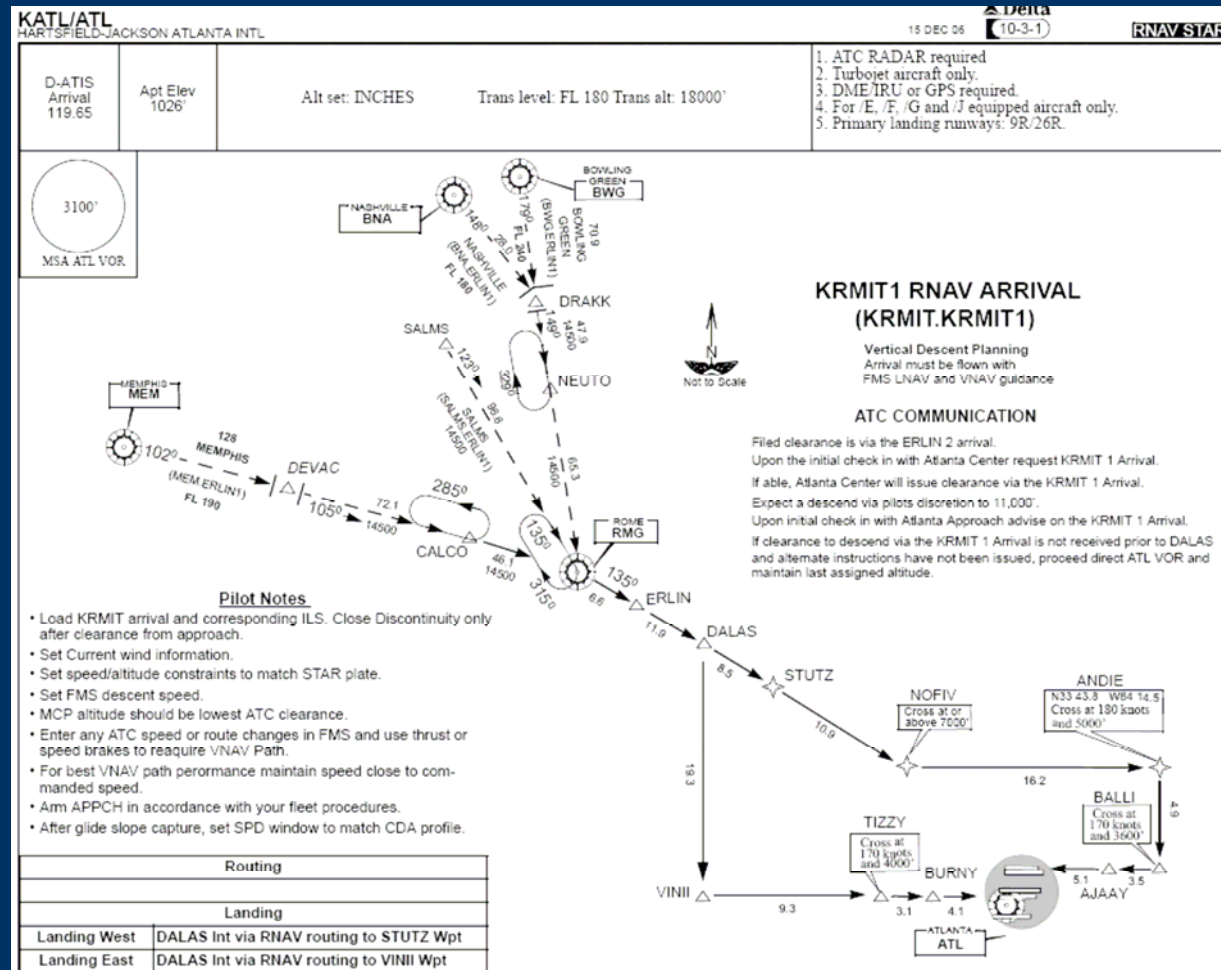
# ATL CDA Phase 1.0 – Implementation

## Ctr to TRACON Handoff:

Check in indicating on the KIRMT PD to 11,000'

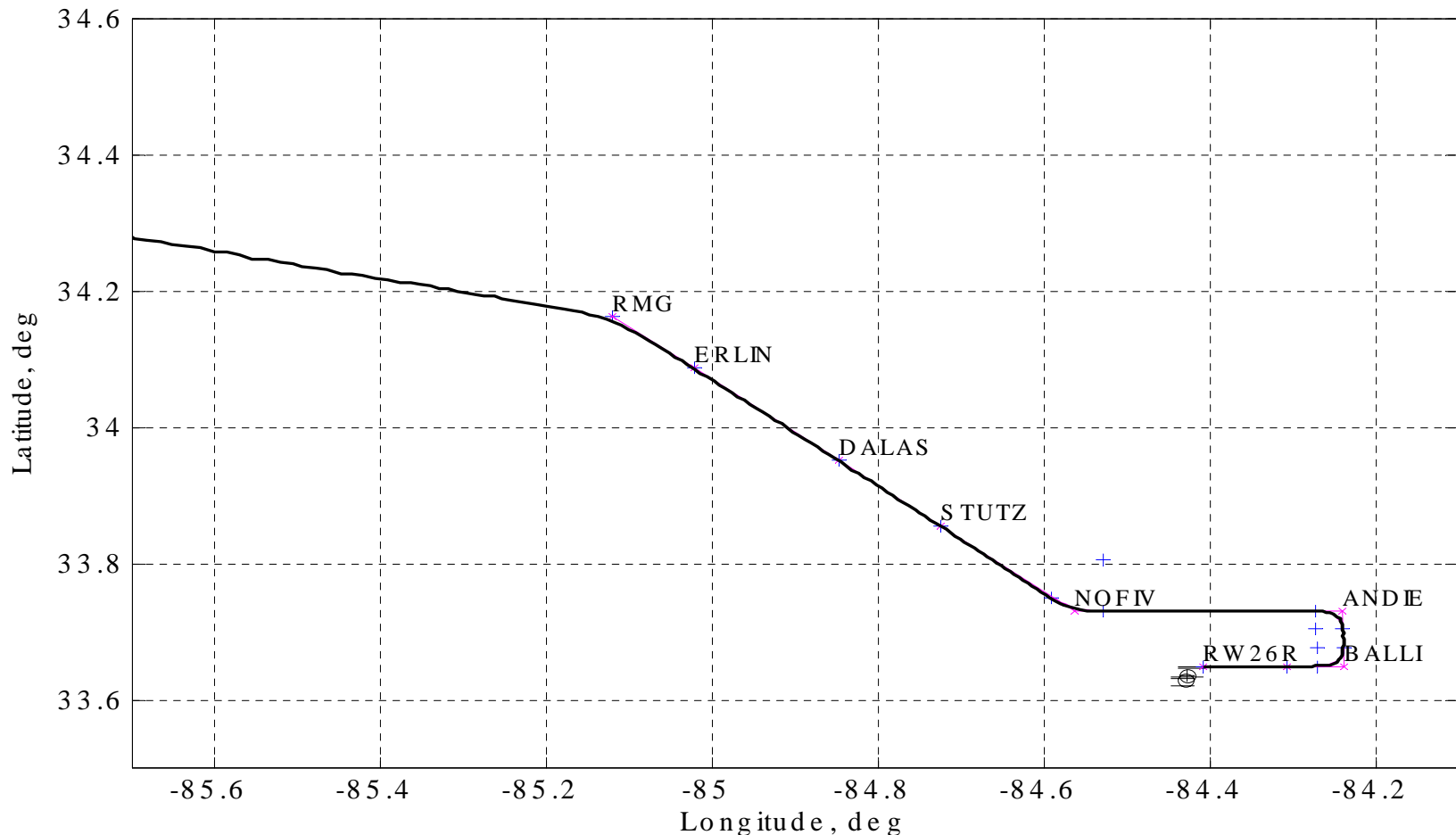
This was the indication that the crew was participating

Clearance to “Descend Via” KIRMT was TRACON’s concurrence with the test  
Clearance for the appropriate ILS was given shortly thereafter



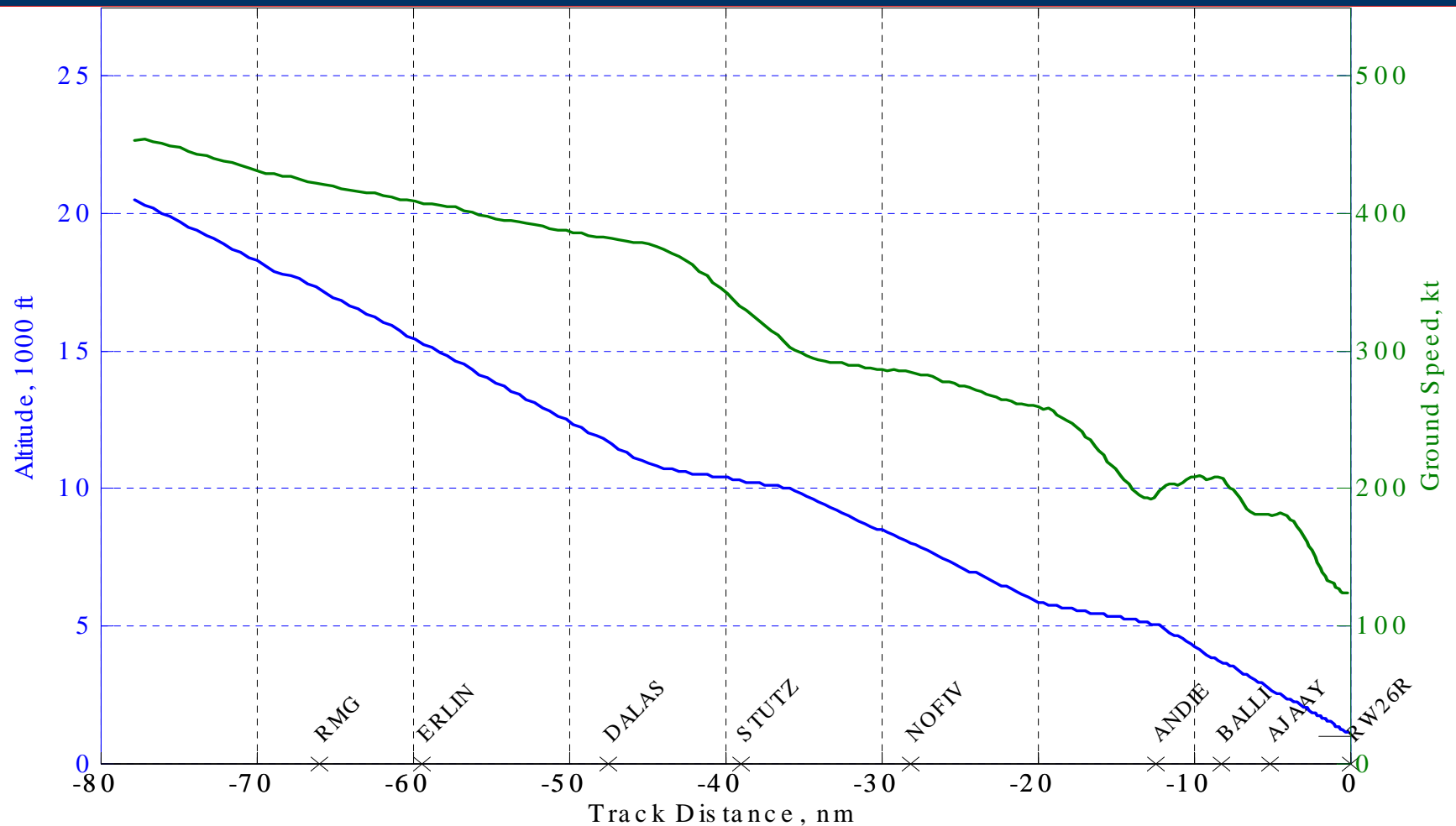
# ATL CDA Phase 1.0 – Results

## West Flow, 18 May 2007, DAL752



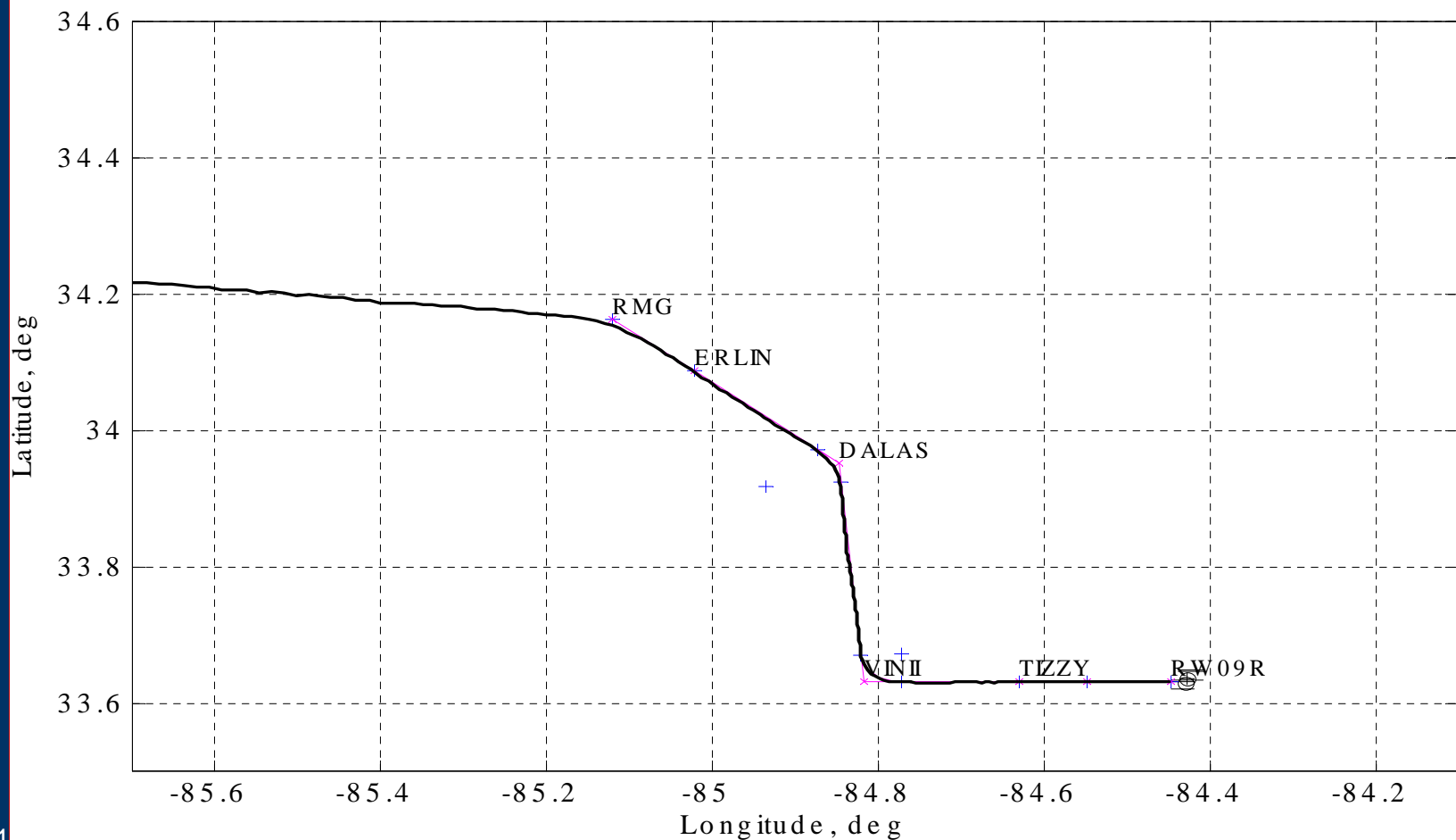
# ATL CDA Phase 1.0 – Results

## West Flow, 18 May 2007, DAL752



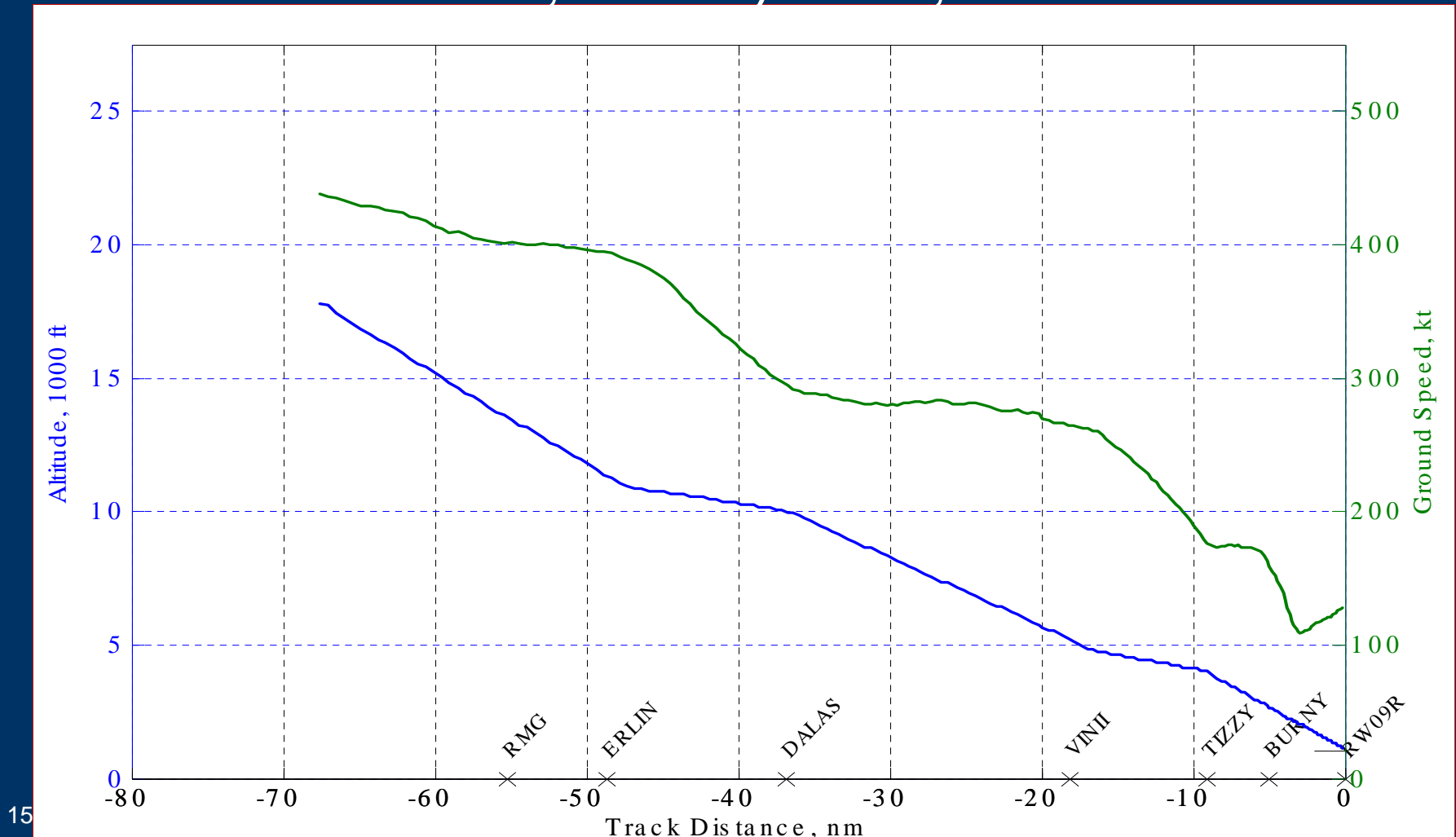
# ATL CDA Phase 1.0 – Results

## East Flow, 19 May 2007, DAL752



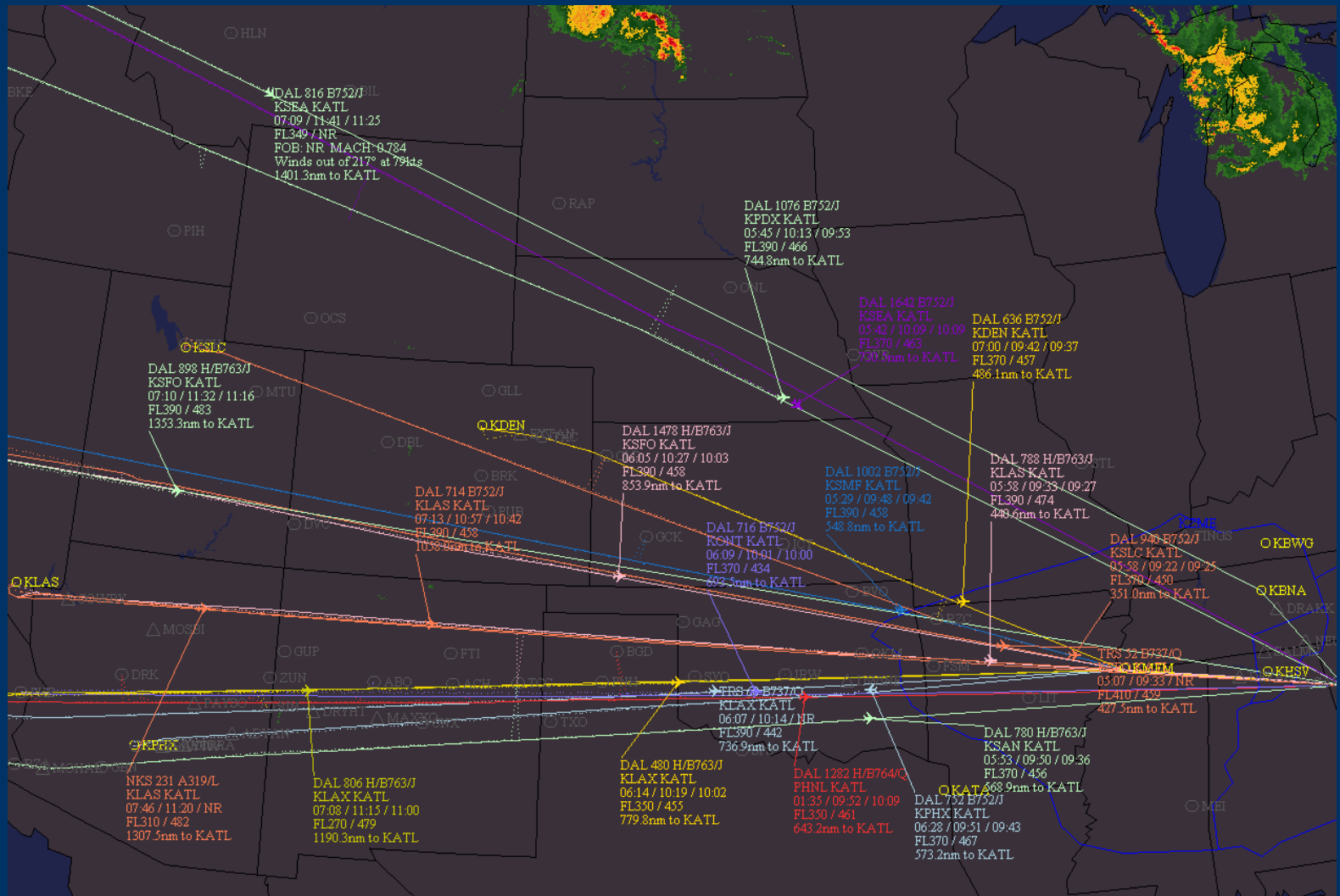
# ATL CDA Phase 1.0 – Results

## East Flow, 19 May 2007, DAL752



# ATL CDA Phase 1.0 – Results

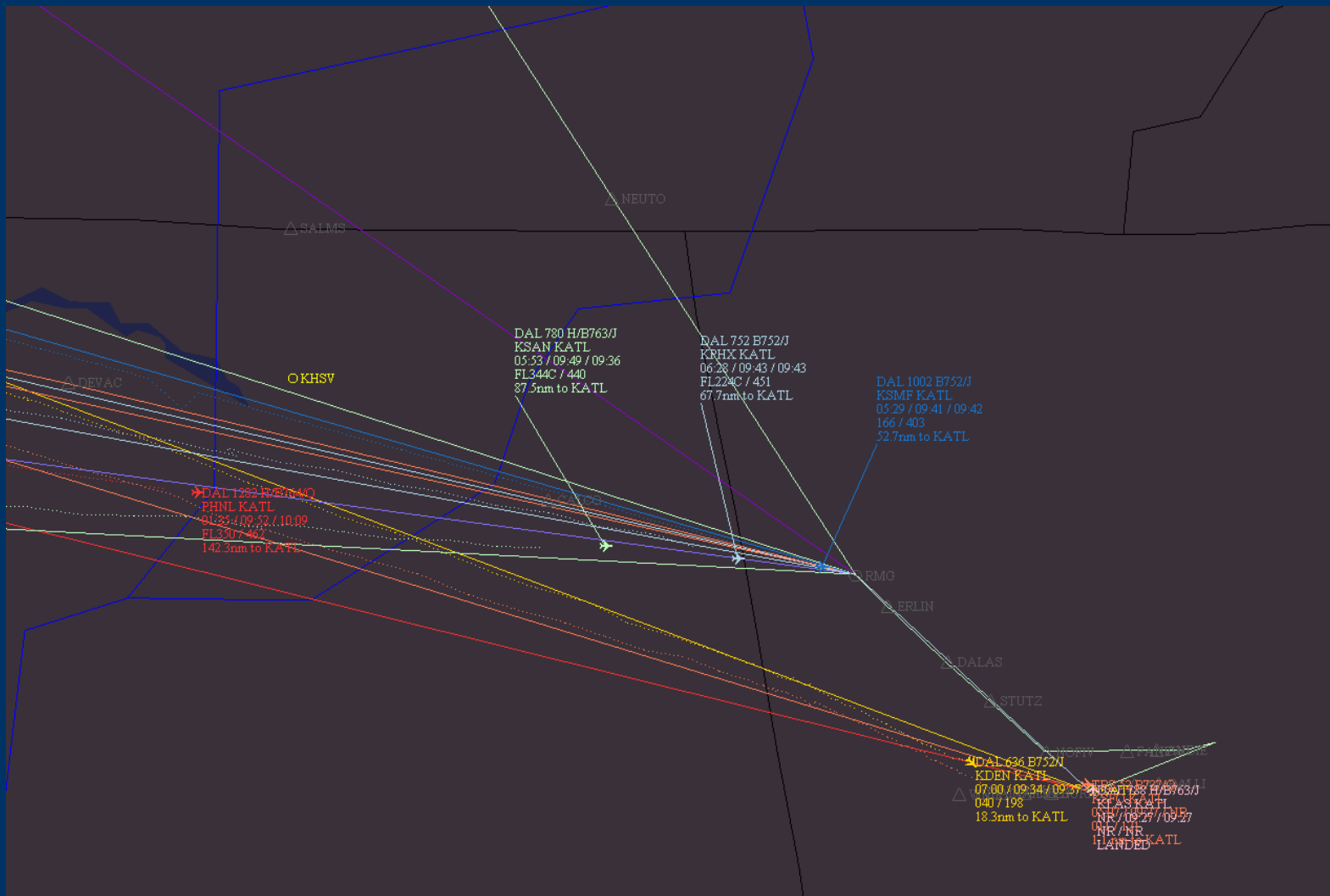
## Merging and Spacing Task (GFF)





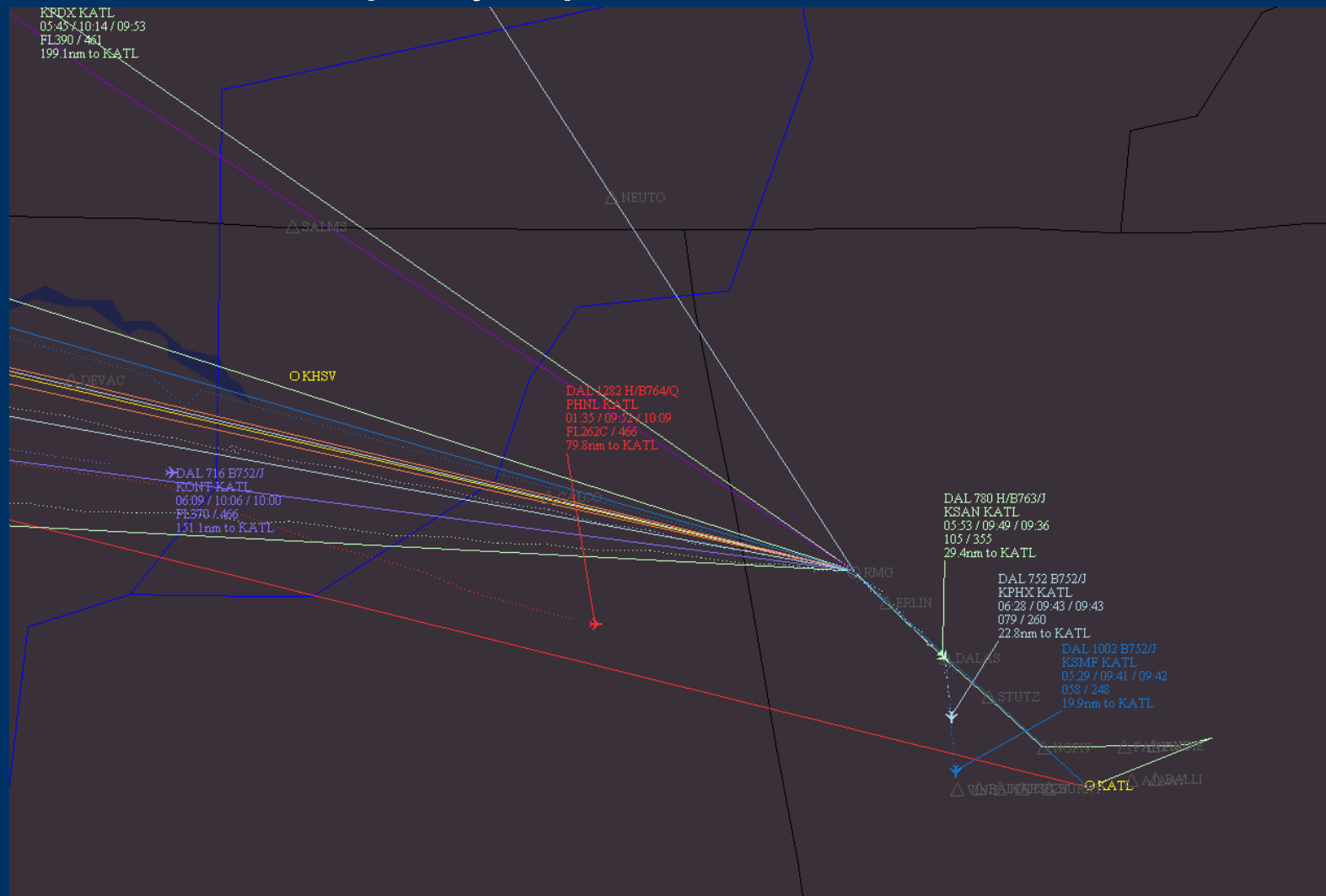
# ATL CDA Phase 1.0 – Results

## Properly Spaced Arrival Flow



# ATL CDA Phase 1.0 – Results

## Properly Spaced Arrival Flow



# ATL CDA Phase 1.0 – Results

# Properly Spaced Arrival Flow

# ATL CDA Phase 1.0 – Summary

---

- Validated predicted vertical and lateral profiles
- Identified need for a common waypoint (within TRACON) to ensure all aircraft are at the same altitude and airspeed
- Identified challenges for spacing and merging
  - FMS ETA performance not sufficient to enable optimum speed changes at 1,000nm to meet RTA due to way in which FMS handles winds
  - Difficult to compensate for errors manually
    - Too many variable and uncertainties to consider
  - These challenges led to the decision to conduct Phase 1.5 before embarking on Phase 2.0 development

# ATL CDA Phase 1.5 - Overview

---

- Collaboration
- HERKO Procedure Design
- Pilot Information Package

# ATL CDA Phase 1.5 - Collaboration

---

- Multiple Airlines (FedEx, AirTran, Delta, and ASA)
  - Increase participation, perspectives, and traffic flow
  - Determine possible test flights based on Red-eye (<0630) arrivals
  
- Simulator Testing
  - All partners are performing simulator validations of the HERKO STAR with modifications to accommodate airspace issues
  
  - The collective views and collaborations will be integrated into the HERKO before pursuing publishing to the Jepps Charts
    - Reasons for publication: Possible operational uses, POI, Testing issues
  
  - Simulator Testing accomplished: B76ER, B73N, B757, CRJ50 & 70
  
  - Testing to be completed by end of December

# ATL CDA Phase 1.5 - Procedure Design

---

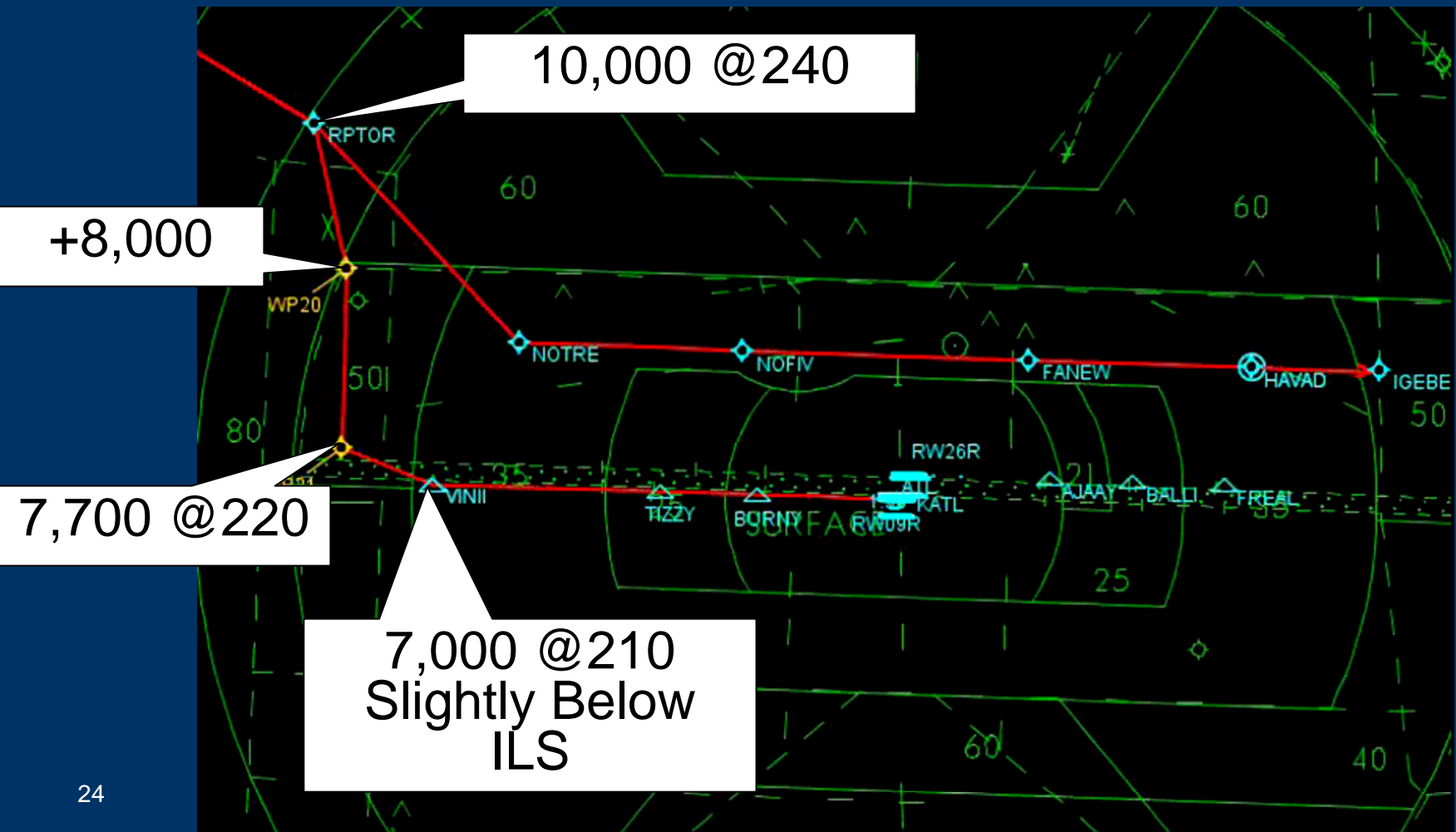
## HERKO STAR

### ■ Designed:

- For both landing directions: 26R and 9R (slides to follow)
- To meet all ATC airspace and traffic requirements within ATL airspace
- Testing partnership consists of:
  - GaTech
  - FAA
  - ALPA
  - ASA
  - AirTran
  - FedEx
  - Delta
- Final results will reflect collective opinion of best procedure, as will the “Pilot Information”

# ATL CDA Phase 1.5 - Procedure Design

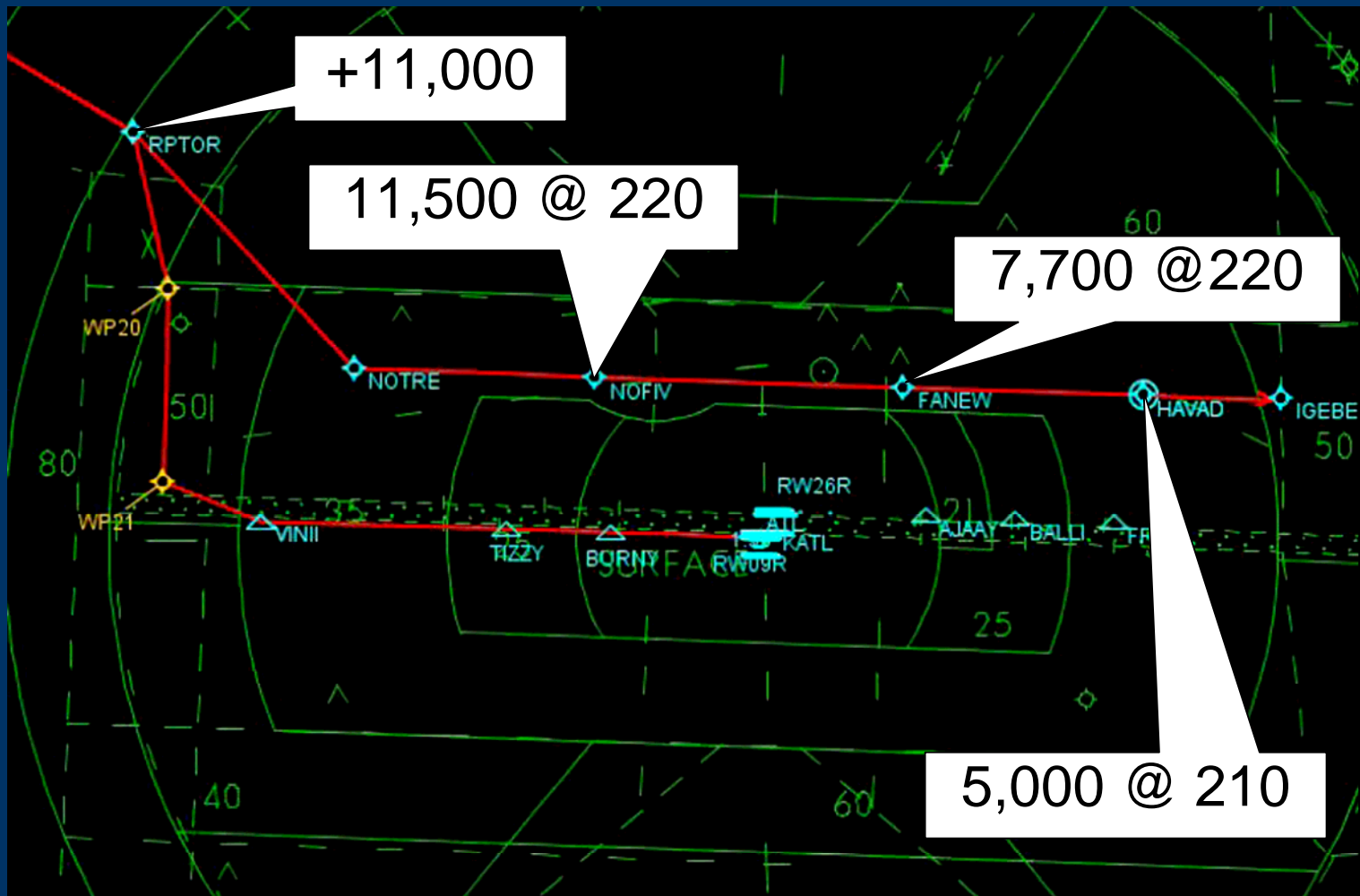
## TARGETS HERKO RNAV STAR – 09R Operations





# ATL CDA Phase 1.5 - Procedure Design

## TARGETS HERKO RNAV STAR – 26R Operations



# ATL CDA Phase 1.5 - Collaboration

---

- Pilot info package
  - All operators may reference DAL's that was used for CDA Phase 1.0
  - Collaboration necessary to create a document satisfactory for all parties
- Establish a target test date once simulator tests and procedure design has been concluded

***Questions regarding Phase 1.5?***

# Delta Air Lines CDA Operations at “Outstations”

---

- Airport Criteria:

- “Outstation” defined as a Non-HUB airport for any operator (reduced possible traffic issues)
- Currently served by a published STAR procedure
  - NOTE: To achieve maximum benefits from CDA arrivals, efficiencies have to be examined in both the lateral and vertical. Utilizing current STARs achieves benefits in the vertical while maintaining established lateral tracks for environmentals. Future lateral efficiencies is a longer process and must be examined.

- Airport analysis determined ~13 candidates within Delta’s operations

- SAN and JAX are our initial candidates going forward

# Delta Air Lines CDA Operations at “Outstations”

---

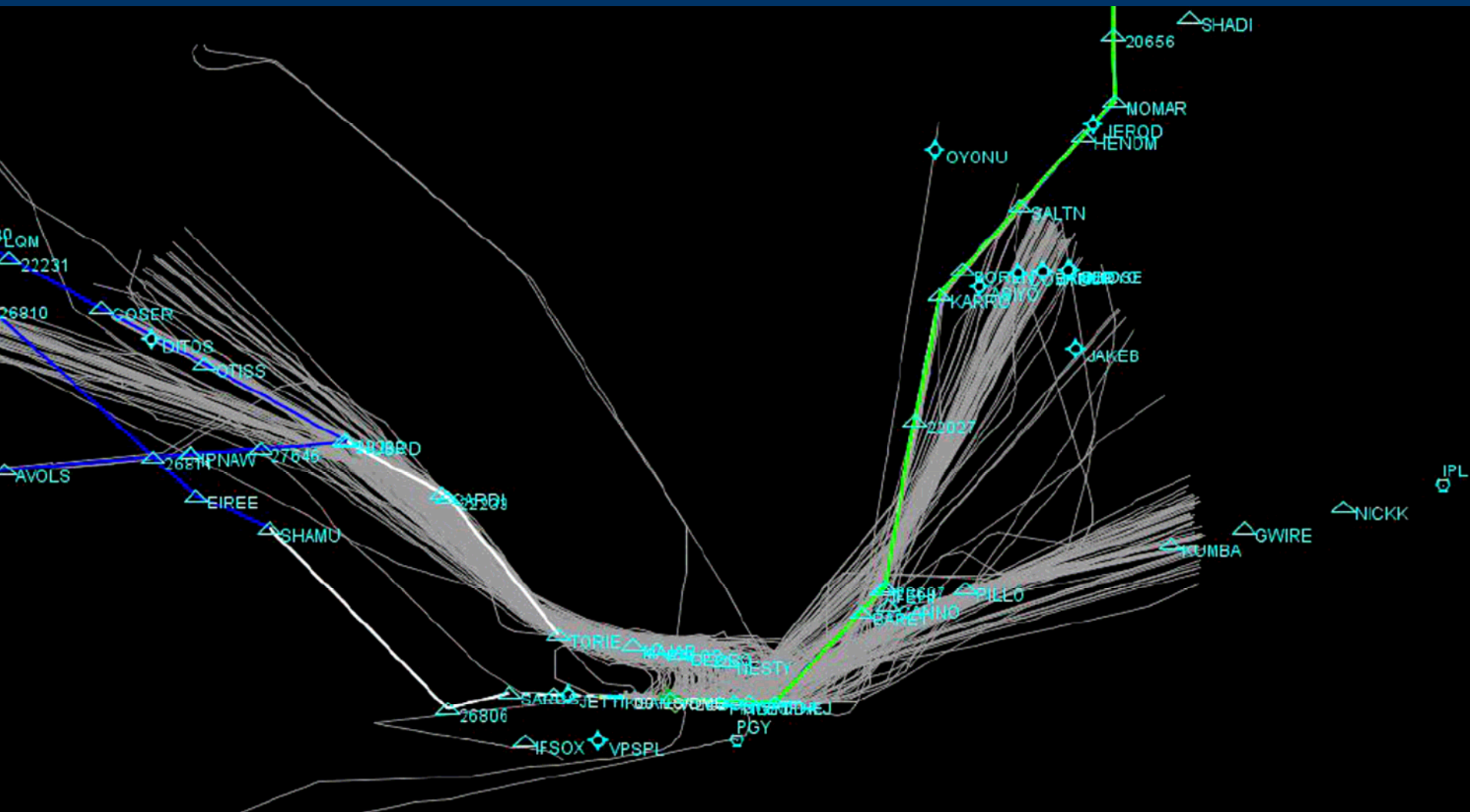
## ■ Procedure analysis:

- Historical landing weights have been obtained
- Historical winds to be utilized
- RADAR tracks obtained to validate assumed lateral paths
- GaTech Fast Time simulations will yield vertical profiles that will be vetted in the simulators
- Air Traffic will be consulted to help determine any existing airspace issues

## ■ Costs:

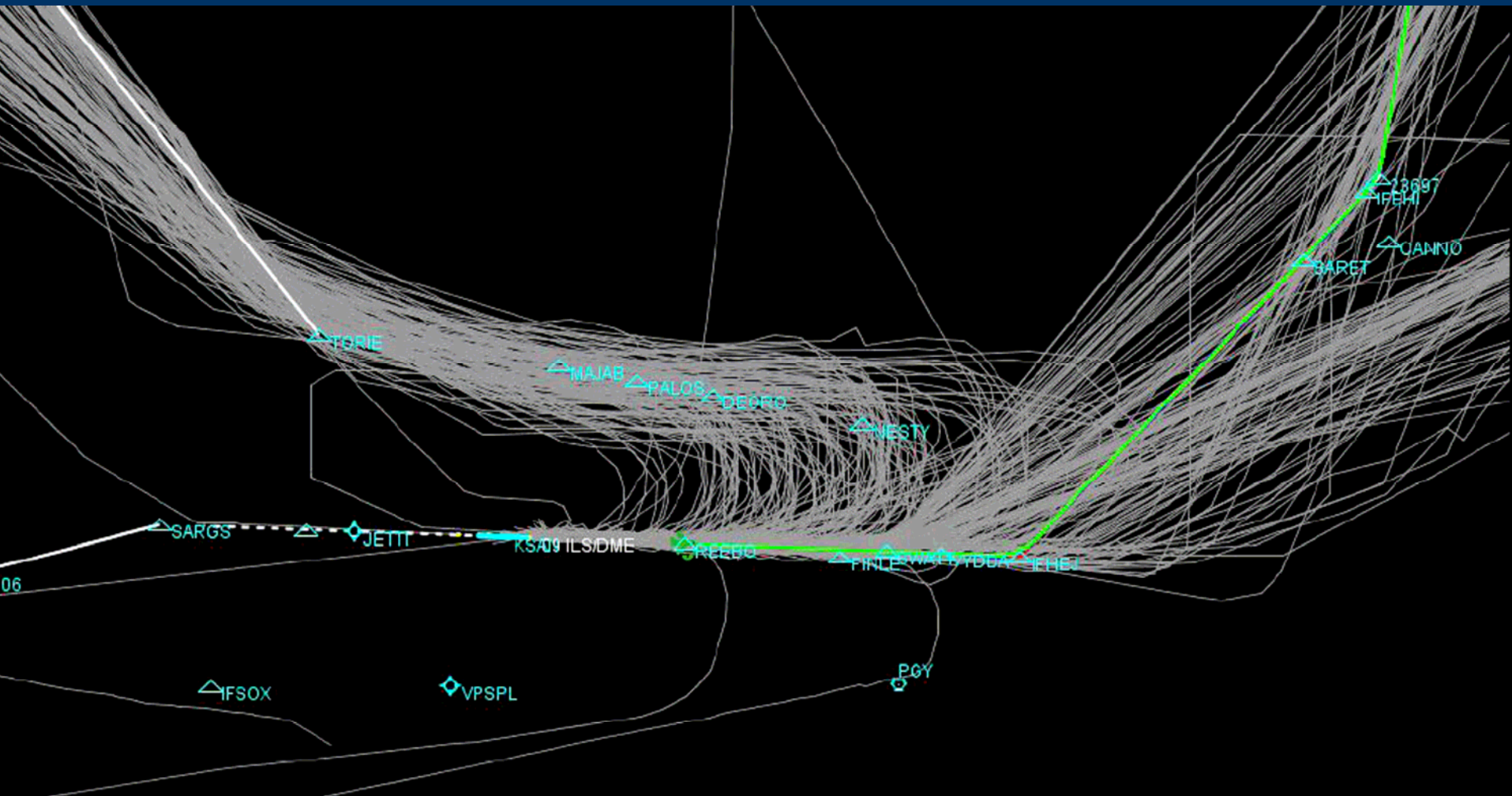
- Assuming 60-70% benefits from proven CDA benefits, annual savings at SAN and JAX approach \$2 million

# SAN – BARET STAR



# Delta Air Lines CDA Operations at “Outstations”

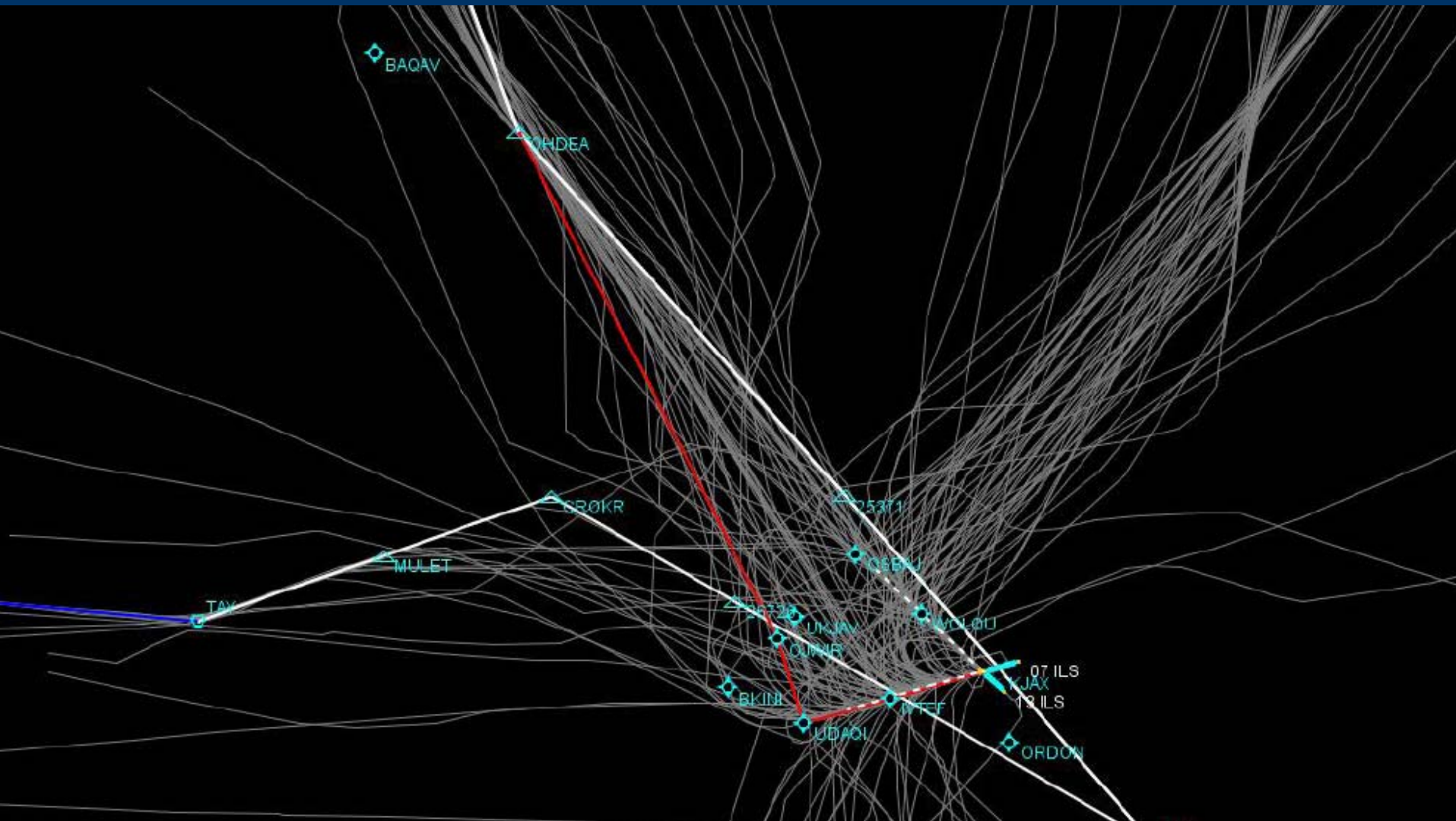
## SAN – BARET STAR





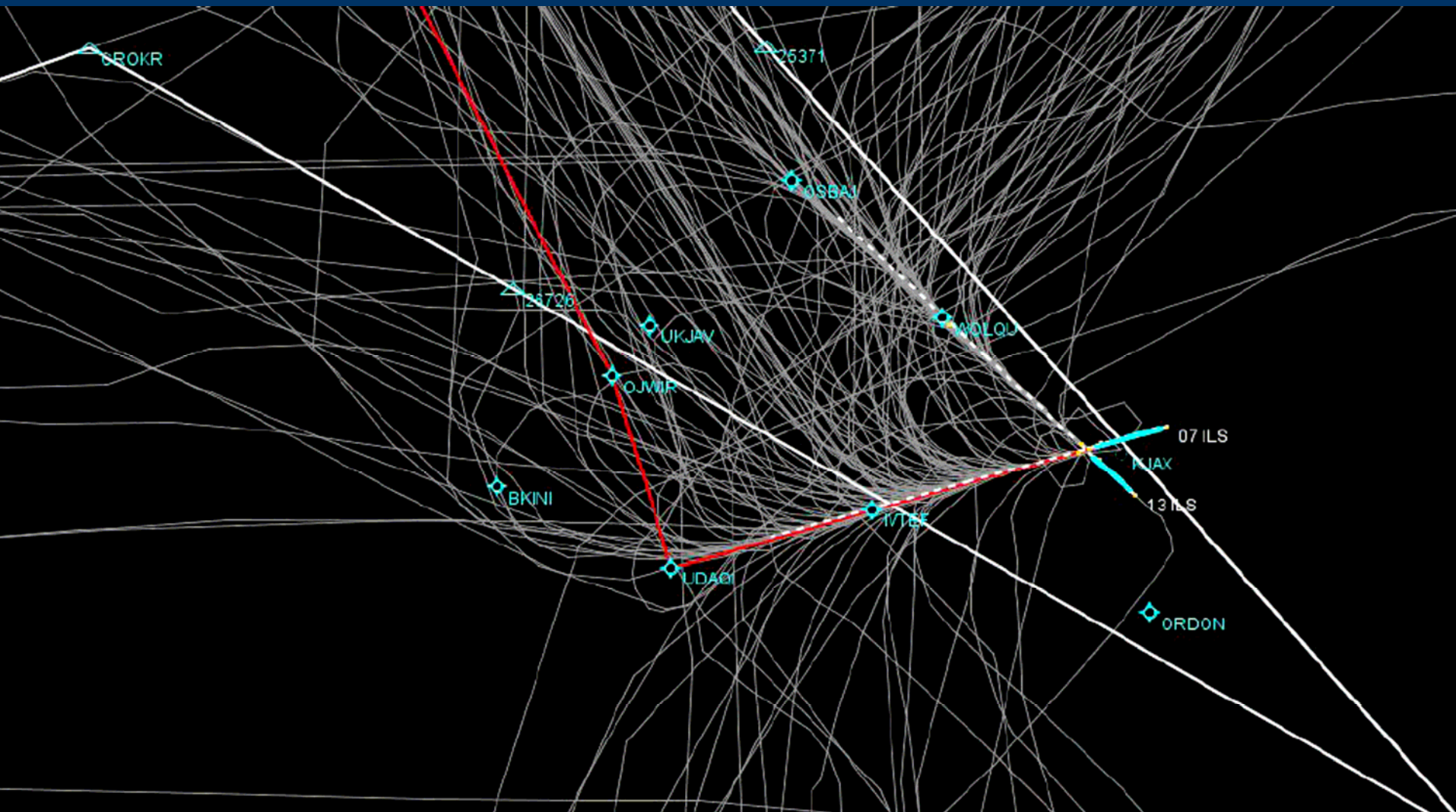
# Delta Air Lines CDA Operations at “Outstations”

## JAX – AMG Arrivals



# Delta Air Lines CDA Operations at “Outstations”

## JAX – AMG Arrivals





# Delta Air Lines CDA Operations at “outstations”

---

- Going forward...

- Continuing to examine all airports that fit the “candidate” criteria
- Facilities will be invited to examine all aspects of Delta’s current CDA programs and are encouraged to participate

***Questions?***